



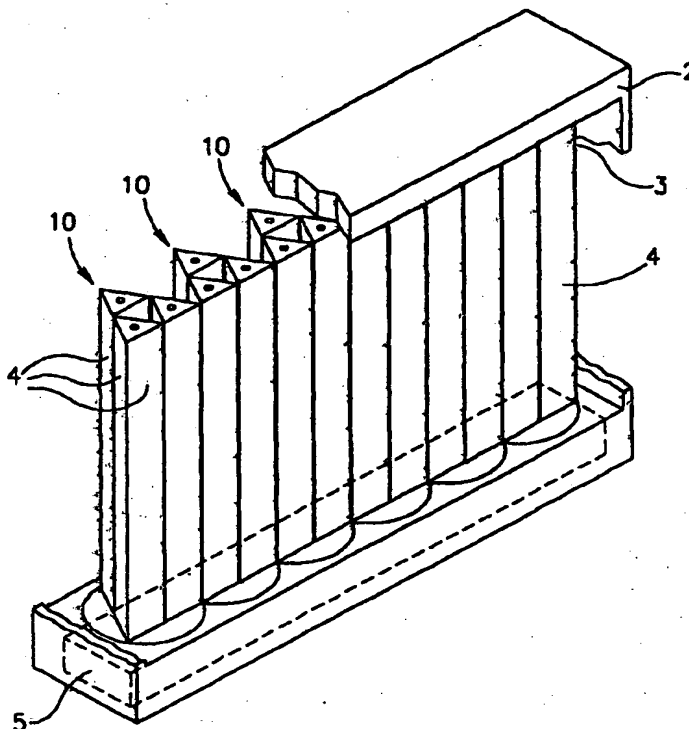
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: <b>PCT/IL99/00671</b></p> <p>(22) International Filing Date: <b>9 December 1999 (09.12.99)</b></p> <p>(30) Priority Data: <b>127612 16 December 1998 (16.12.98) IL</b></p> <p>(71)(72) Applicant and Inventor: <b>KOREM, Aharon [IL/IL]; Hanadiv Street 44, 46499 Herzliya (IL).</b></p> <p>(74) Agent: <b>REINHOLD COHN AND PARTNERS; P.O. Box 4060, 61040 Tel Aviv (IL).</b></p>	<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i></p>	

(54) Title: CHANGEABLE SIGN OF THE TRIANGULAR SIGN-ELEMENT TYPE

## (57) Abstract

A changeable sign, comprising a housing (2) formed with at least one display opening (3) for displaying a sign, a plurality of three-sided sign elements (4) mounted in parallel side-by-side relation in the housing with each sign element rotatable about its respective longitudinal axis and a drive (5) for rotating said sign elements to change the displayed sign. Each side of the sign elements bears a section of an overall sign to be displayed through the display opening in the housing according to the rotary positions of said sign elements. The sign elements are mounted in a plurality of assemblies each including a plurality of sign elements, with each assembly rotatable about its respective longitudinal axis and the drive rotates each assembly about its respective longitudinal axis, and also rotates each sign element about its respective longitudinal axis, to change the displayed sign.



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## **CHANGEABLE SIGN OF THE TRIANGULAR SIGN-ELEMENT TYPE**

### **FIELD AND BACKGROUND OF THE INVENTION**

The present invention relates to changeable signs, and particularly to changeable signs of the type which include triangular, or three-sided, sign elements.

5 In recent years, changeable signs of the triangular element type have become increasingly popular. Such signs include a housing containing a plurality of triangular, or three-sided, sign elements mounted in parallel side-by-side relation and each rotatable about its respective longitudinal axis, with each side of each sign element bearing a section of an overall sign to be displayed  
10 according to the rotary positions of the sign elements. The triangular shape of each sign element enables each element to be rotated without interference with the adjacent sign elements, so that for each 120° rotation of the sign elements, a different sign may be displayed. Such a construction permits only three different signs to be displayed, and only from one side of the housing. An example of a  
15 know construction is described in Perez US Patent 5,255,465, which discloses a housing having signs on two of its opposite sides, each side including a plurality of such triangular sign elements.

Another construction is described in US Patent 5,297,353, which describes a construction for producing multiple visual displays by rotating a base  
20 containing a plurality of triangular sign elements.

An object of the present invention is to provide a changeable sign of the triangular-element type but capable of displaying more than three different signs.

## SUMMARY OF THE INVENTION

According to a broad aspect of the present invention, there is provided a changeable sign comprising a housing formed with at least one display opening for displaying a sign; a plurality of three-sided sign elements mounted in parallel  
5 side-by-side relation in the housing with each sign element rotatable about its respective longitudinal axis; each side of each sign element bearing a section of an overall sign to be displayed through the display opening in the housing according to the rotary positions of the sign elements; and a drive for rotating the sign elements to change the displayed sign; characterized in that the sign  
10 elements are mounted in a plurality of assemblies each including a plurality of sign elements, with each assembly rotatable about its respective longitudinal axis; and in that the drive rotates each assembly about its respective longitudinal axis, and also rotates each sign element about its respective longitudinal axis, to change the displayed sign.

15 As will be described more particularly below, such a changeable sign construction permits more than three signs to be displayed.

Thus, in one preferred embodiment of the invention described below, each sign element assembly includes three sign elements mounted in a triangular pattern such that the sides of two of the sign elements in each assembly are  
20 alignable with the display opening of the housing when displaying an overall sign. Such a construct permits four different signs to be displayed.

More particularly, in this embodiment, the drive includes a motor coupled to the sign element assemblies to rotate them about their respective longitudinal axes. Also, the drive further includes a gear fixed to and coaxial with each of the  
25 sign elements, and a 120° sector gear for each sign element assembly fixed to the housing and coupleable to the gears fixed to the sign elements of the respective assembly to rotate only one sign element about its longitudinal axis during each 120° rotation of the assemblies about their respective longitudinal axes.

A further embodiment of the invention is described below for purposes of  
30 example, wherein each sign element assembly includes four sign elements

mounted in a rectangular pattern such that the sides of two sign elements in each assembly are alignable with the display opening of the housing when displaying an overall sign. In this described embodiment, the housing includes a display opening on each of its opposite sides. The sides of two sign elements in each assembly are alignable with one of the display openings in the housing, and the sides of the other two sign elements in each assembly are alignable with the other of the display openings in the housing, to display an overall sign in each of the display openings. Such a construction thus permits six different signs to be displayed from each of its two opposite sides.

10 According to further features in this described embodiment, the drive includes a first motor coupled to alternate sign element assemblies to rotate displaying an overall sign. Such a construct permits four different signs to be displayed.

More particularly, in this embodiment, the drive includes a motor coupled to the sign element assemblies to rotate them about their respective longitudinal axes. Also, the drive further includes a gear fixed to and coaxial with each of the sign elements, and a 120° sector gear for each sign element assembly fixed to the housing and coupleable to the gears fixed to the sign elements of the respective assembly to rotate only one sign element about its longitudinal axis during each 120° rotation of the assemblies about their respective longitudinal axes.

A further embodiment of the invention is described below for purposes of example, wherein each sign element assembly includes four sign elements mounted in a rectangular pattern such that the sides of two sign elements in each assembly are alignable with the display opening of the housing when displaying an overall sign. In this described embodiment, the housing includes a display opening on each of its opposite sides. The sides of two sign elements in each assembly are alignable with one of the display openings in the housing, and the sides of the other two sign elements in each assembly are alignable with the other of the display openings in the housing, to display an overall sign in each of the

display openings. Such a construction thus permits six different signs to be displayed from each of its two opposite sides.

According to further features in this described embodiment, the drive includes a first motor coupled to alternate sign element assemblies to rotate the  
5 alternate assemblies together about their respective axes, and a second motor coupled to the remaining alternate sign element assemblies to rotate such assemblies together about their respective axes. The drive further includes a sign element gear fixed coaxially to each of the sign elements, and an assembly gear fixed to the housing for and coaxial with each sign element assembly and coupled  
10 to the gears of the sign elements in the respective assembly to rotate the sign elements about their respective axes during the rotation of the sign element assemblies about their respective axes.

Further features and advantages of the invention will be apparent from the description below.

## 15 BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view, partly broken away, illustrating one form of  
20 changeable sign constructed in accordance with the present invention;

Fig. 2 more particularly illustrates the internal construction of the sign of Fig. 1;

Figs. 3a-3d illustrate four conditions of the sign to produce four different displays;

25 Fig. 4 is a perspective view, partly broken away, illustrating another embodiment of the invention wherein the assemblies include four sign elements enabling the display of six different signs from each of the two opposite sides of the sign housing;

Fig. 5 more particularly illustrates the internal construction of the sign of Fig. 4;

Fig. 6 is a diagram helpful in understanding the operation of the sign of Figs. 4 and 5; and

- 5        Figs. 7a-7f illustrate six conditions of the sign of Fig. 4 for displaying six different signs from each of the two opposite sides of the sign housing.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

The changeable sign illustrated in Fig. 1 includes a housing, generally designated 2, formed with a display opening 3 at one side for displaying a  
10    plurality of a triangular sign elements, generally designated 4, which can be rotated about their own axes in order to change the overall sign being displayed. The sign illustrating in Fig. 1 further includes a drive, schematically shown at 5, for rotating the triangular sign elements 4 about their respective axes.

As well known in changeable signs of this type, each of the triangular  
15    elements 4 bears a section or strip of an overall sign to be displayed, such that the sign elements may be rotated to three different positions to display three different signs. Since such triangular-element signs are well known, further details of its construction and operation are not set forth herein.

As brought out in the introductory portion of the specification, such  
20    changeable signs are capable of displaying only three different signs, one for each of the three sides of the triangular sign elements. Also, they can display the signs only through one side of the housing, so that if the housing is to display signs on its two opposite sides, two sets of triangular sign elements must be provided, one for each side, as shown for example in the above-cited US Patent 5,355,465.

- 25        Fig. 2 illustrates a construction enabling four different signs to be displayed from one side of the sign housing; whereas Fig. 4 illustrates a construction enabling six different signs to be displayed from each of the two opposite sides of the housing.

In the construction illustrated in Fig. 2, the triangular, or three-sided, sign elements (4, Fig. 1) are mounted in a plurality of assemblies, each generally designated 10, with each assembly including a plurality of the three-sided side elements, therein designated 11, 12 and 13, respectively. Each sign element 11, 12, and 13 is constructed as in the conventional triangular-element changeable sign with each of its three sides bearing a section or strip of an overall sign to be displayed according to the rotary positions of the sign elements. Thus, sign element 11 includes sign sections of a sign on each of its three sides 11a, 11b, 11c; sign element 12 includes sections on each of its three sides 12a, 12b, 12c; and similarly, sign element 13 includes sign sections on each of its three sides 13a, 13b, 13c.

Each of the assemblies 10 includes a gear 15 which is rotatable about the longitudinal axis 15a of the respective assembly. The three sign elements 11, 12, 13, of each assembly 10 are rotatably mounted along their respective longitudinal axes 11d, 12d, 13d, to gear 15 at 120° spacings around the circumference of gear 15. Each sign element 11, 12, 13 includes a gear 11e, 12e, 13e fixed to and coaxial with the respective sign element so as to rotate the sign element around its respective longitudinal axis 11d-13d, respectively.

The drive illustrated in Fig. 2 further includes, for each assembly 10, a 120° sector gear 17 fixed to the sign housing 2 and aligned with the three gears 11e, 12e, 13e of the three sign elements 11-13 in the respective assembly. Sector gear 17 is fixed centrally of each assembly 10 so as to be capable of meshing with gears 11e, 12e, 13e when the assembly gear 15 is rotated with the three sign elements 11-13. The drive further includes a motor 18 driving a worm 19 meshing with the assembly gears 15 of all the assemblies 10 to thereby rotate the assemblies in order to change the signs being displayed. It will be seen that since section gear 17 extends only for 120°, it will mesh at any one time with only one of the gears 11e, 12e, 13e of the three sign elements 11-13 in the respective assembly 10 during each 120° rotation of the assembly.



Each sector gear 17 has a gear ratio of 2:1 with respect to each of the gears 11e, 12e, 13e, in its respective assembly, such that a 120° rotation of the assembly with respect to its sector gear will rotate through an arc of 240° the gear 11e-13e of the sign element with which it is meshed.

5 Figs. 3a-3d illustrate the four positions of the assemblies 10 in the sign of Fig. 2 for producing four different displays according to the rotary position of assemblies 10.

The initial position of the assemblies 10 is shown in Fig. 3a, and also in Fig. 2, wherein sides 11a and 12a are aligned with and viewable through  
10 window 3 of the sign housing 2 of Fig. 1. Thus, the sign displayed will be constituted of the sign sections on sides 11a, 12a of the assemblies 10. None of the sides of sign elements 13 will be viewable in this condition of the sign.

Fig. 3b illustrates the condition after the three assemblies 10 have been rotated 120°. Such rotation moves the three sign elements 11-13 120° to the  
15 positions illustrated in Fig. 3b. In addition, during this rotation, gear 13e of sign element 13 will mesh with the fixed sector gear 17 so as to rotate sign element 13 240° to the position illustrated in Fig. 3b. Thus, when the sign is in the condition of Fig. 3b, the sign being displayed will be constituted of the sign sections carried on sides 13a and 11c respectively, of the sign elements 13 and 11. None of the  
20 sides of sign elements 12 will be viewable in this condition of the sign.

Fig. 3c illustrates the condition of the sign when the assemblies 10 are rotated a further 120°, whereupon the sign sections carried on side 12c of sign elements 12 and side 13c on side elements 13 will be displayed. Fig. 3d illustrates the condition wherein the assemblies 10 are rotated a further 120°, whereupon the  
25 sign displayed will be constituted of the sign sections on sides 11b and 12b, respectively.

After the fourth sign has thus been displayed, it is necessary to reverse the sequence of rotation of the assemblies 10, in which case the same four signs will again be displayed but in the reverse sequence.

Figs. 4 and 5 illustrate a construction wherein each of the assemblies, generally designated 20, includes four sign elements 21-24, each of the same three-sided construction as elements 11-13 in Figs. 1 and 2; that is, each sign element 21-24 includes three sides 21a, 21b, 21c, 22a- 24c, each bearing a section of an overall sign to be displayed according to the rotary positions of the sign elements.

However, in Figs. 4 and 5, the four sign elements 21-24 of each assembly are mounted in a rectangular pattern (rather than in a triangular pattern) on a gear 25 for the respective assembly. Elements 21-24 are rotatable about their respective longitudinal axes 21d-24d which are spaced 90° from each other around the axis 25a of the assembly gear 25. Each sign element further includes a gear 21e-24e fixed to and coaxial with the respective sign element 21-24.

In this case, gears 21e-24e mesh with a 360° gear 27 fixed to the housing 2 of the sign for each assembly 20. In addition, the drive includes two motors 28a, 28b, each coupled by a worm 29a, 29b to drive the gears 25 of the assemblies 20. Worm 29a is coupled to the gears 25 of alternate assemblies (e.g. the odd assemblies); whereas worm 29b is coupled to the gears 25 of the remaining alternate assemblies (e.g. the even assemblies).

It will be seen from Figs. 4 and 5 that the four-element assembly arrangement can be used for displaying one side of each of a pair of adjacent sign elements on one side of the sign 2, and one side of each of the remaining pair of sign elements on the opposite side of the sign. Thus, sign 2 includes a window 3a on one side for displaying the sign constituted of the sides of two of the sign elements (e.g., sides 21a, 22a, Fig. 5), and another window 3b for displaying the sign constituted of the sides of the remaining two sign elements (e.g., sides 23a, 24a, Fig. 5).

Whenever it is desired to change the signs displayed in openings 3a, 3b of the sign housing 2, motor 29a is first energized to rotate the gears 25 of the odd assemblies 20 180°; and then motor 28b is energized to rotate the gears 25 of the even assemblies 180°. This sequential energization of the odd and even

assemblies 20 is necessary to permit one assembly to be rotated without interference with the adjacent assemblies on its opposite sides. This is more clearly seen in Fig. 6, wherein the outermost surface of one assembly traces the circular path indicated by broken line 20a, and the outermost surface of the next  
5 adjacent assembly 20 traces the circular path indicated by the broken line 20b. To accommodate these circular paths of adjacent assemblies without interference, there should be a small spacing, indicated at 20c, between each assembly and the adjacent one.

When the assemblies are thus rotated 180°, it will be seen that the pair of  
10 sign elements facing window 3a at one side of the sign housing 2 will be rotated so as to face the window 3b on the opposite side of the sign housing. It will also be seen that the rotation of each assembly 20 about its longitudinal axis 25a will also rotate each of the four sign elements 21-24 about their respective longitudinal axes 21d-24d, respectively, in view of the meshing of the element  
15 gears 21e-24e with the center gear 27 fixed to the housing 2 centrally of the respective assembly. The gear ratio between each assembly gear 27 and the four gears 21e-24e in the respective assembly is such that for each 180° rotation of the respective assembly, the gears 21e-24e meshing with the assembly gear will rotate 120°.

20 Such an arrangement permits six different signs to be displayed in each of the two sign openings 3a, 3b, as shown by the diagrams of Fig. 7a-7f.

Assuming that the assemblies 20 are in the condition illustrated in Fig. 7a (which is the same as in Fig. 5), it will be seen that one sign (e.g. in window 3a) consists of the sides marked "a" of the two sign elements 21, 22 of each  
25 assembly 20; and the other sign (e.g. in window 3b) consists of the sides marked "a" on the two remaining elements 23, 24 of each assembly.

Fig. 7b illustrates the condition wherein the assemblies have been rotated 180° as described above, whereupon sides "c" of the two elements 23, 24 form one sign, and sides "c" of the remaining two elements 21, 22 form the opposite  
30 sign; Fig. 7c illustrates the condition wherein the assemblies are rotated another

180°, whereupon sides "b" of the two elements 21, 22 form one sign, and the sides "b" of the remaining two elements, 23, 24 form the opposite sign; Fig. 7d illustrates the condition wherein the assemblies are rotated a further 180° whereupon sides "a" of the two elements 23, 24 form one sign, and sides "a" of the remaining two elements 21, 22 form the opposite sign; Fig. 7e illustrates the condition wherein the assemblies are rotated another 180°, wherein sides "c" of elements 21, 22 form one sign, and sides "c" of elements 23, 24 form the opposite sign; and Fig. 7f illustrates the condition wherein the assemblies are rotated another 180° wherein sides "b" of elements 23, 24 form one sign and sides "b" of elements 21, 22 form the opposite sign.

While the invention has been described with respect to several preferred embodiments, it will be appreciated that these are set forth merely for purposes of example, and that many variations may be made. For example, in the Figs. 4-6 embodiment, instead of using two separate motors for separately driving the odd and even assemblies 20, a single motor may be used including selective clutching. Many other variations, modifications and applications of the invention will be apparent.

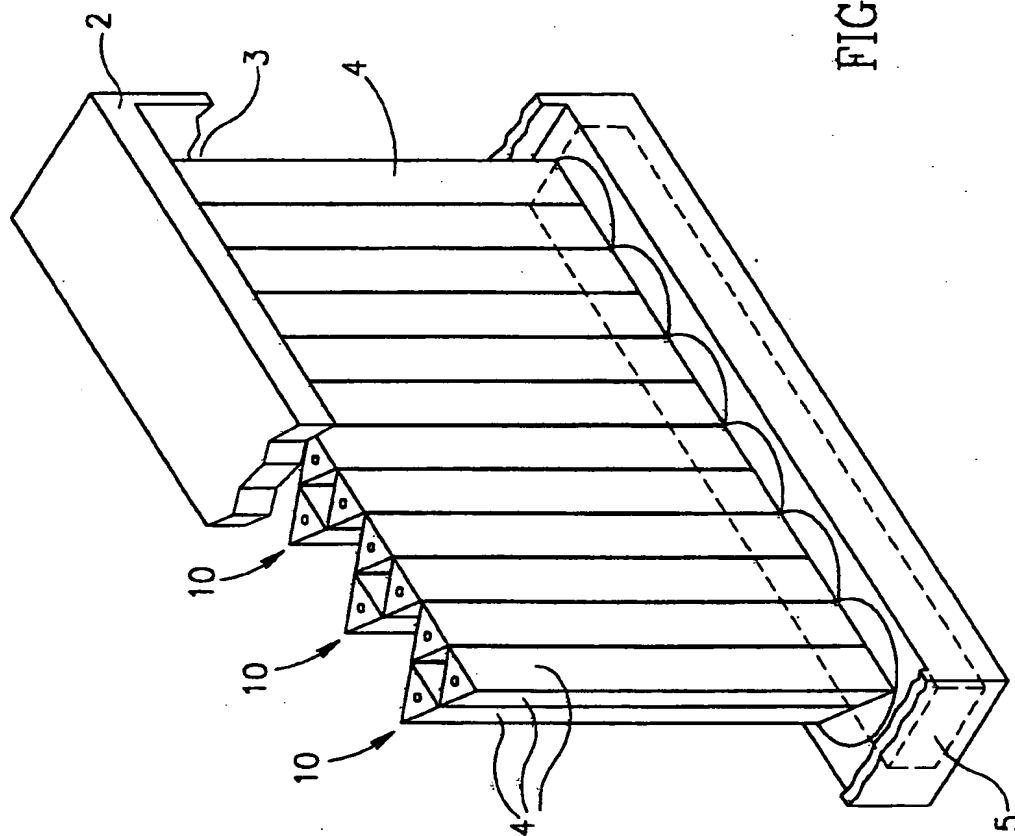
**CLAIMS:**

1. A changeable sign, comprising:
  - a housing formed with at least one display opening for displaying a sign;
  - a plurality of three-sided sign elements mounted in parallel side-by-side  
5 relation in said housing with each sign element rotatable about its respective longitudinal axis;
  - each side of each sign element bearing a section of an overall sign to be displayed through said display opening in the housing according to the rotary positions of said sign elements;
  - 10 and a drive for rotating said sign elements to change the displayed sign;
  - characterized in that said sign elements are mounted in a plurality of assemblies each including a plurality of sign elements, with each assembly rotatable about its respective longitudinal axis;
  - and in that said drive rotates each assembly about its respective  
15 longitudinal axis, and also rotates each sign element about its respective longitudinal axis, to change the displayed sign.
2. The changeable sign according to Claim 1, wherein each said assembly includes three of sign elements mounted in a triangular pattern such that the sides of two of said sign elements in each assembly are alignable with said display  
20 opening of the housing when displaying an overall sign.
3. The changeable sign according to Claim 2, wherein said drive includes a motor coupled to said sign element assemblies to rotate them about their respective longitudinal axes.
4. The changeable sign according to Claim 3, wherein said drive further  
25 includes a gear fixed to and coaxial with each of said sign elements, and a 120° sector gear for each sign element assembly fixed to said housing and coupleable to said gears fixed to the sign elements of the respective assembly to rotate only one sign element about its longitudinal axis during each 120° rotation of said assemblies about their respective longitudinal axes.

5. The changeable sign according to Claim 4, wherein the gear ratio between said sector gear and the gear of each sign element in the respective assembly is such that a 120° rotation of the assembly with respect to the sector gear rotates the gear of the sign element meshing with the sector gear 240°.
- 5 6. The changeable sign according to any one of Claims 2-5, wherein the sides of said sign elements bear sections of four different signs to be selectively displayed.
7. The changeable sign according to Claim 1, wherein each said assembly includes four of said sign elements mounted in a rectangular pattern such that the  
10 sides of two of said sign elements are alignable which said display opening of the housing when displaying an overall sign.
8. The changeable sign according to Claim 7, wherein said housing includes a display opening on each of its opposite sides; and wherein the sides of two of said sign elements in each assembly are alignable with one of said display  
15 openings in the housing, and the sides of the other two of said sign elements in each assembly are alignable with the other of said display openings in the housing, to display an overall sign in each of said display openings.
9. The changeable sign according to either of Claims 7 or 8, wherein said drive includes:
- 20 a first motor coupled to alternate sign element assemblies to rotate said alternate assemblies together about their respective axes, and a second motor coupled to the remaining alternate sign element assemblies to rotate said latter assemblies together about their respective axes.
10. The changeable sign according to Claim 9, wherein said drive further  
25 includes:
- a sign element gear fixed coaxially to each of said sign elements;
  - and an assembly gear fixed to said housing for and coaxial with each sign element assembly and coupled to the gears of said sign elements in the respective assembly to rotate the sign elements about their respective axes during the  
30 rotation of the sign element assemblies about their respective axes.

11. The changeable sign according to Claim 10, wherein the gear ratio between said assembly gear fixed to said housing, and the gear of each sign element in the respective assembly, is such that, for each 180° rotation of the respective assembly, the gears of the sign elements are rotated 120°.
- 5 12. The changeable sign according to any one of Claims 8-10, wherein the sides of said sign elements bear sections of six different signs to be selectively displayed in each of the two display openings.
13. The changeable sign according to any of Claims 1-12 substantially as described hereinabove.
- 10 14. The changeable sign according to any of claims 1-12 substantially as illustrated in any of the drawings.

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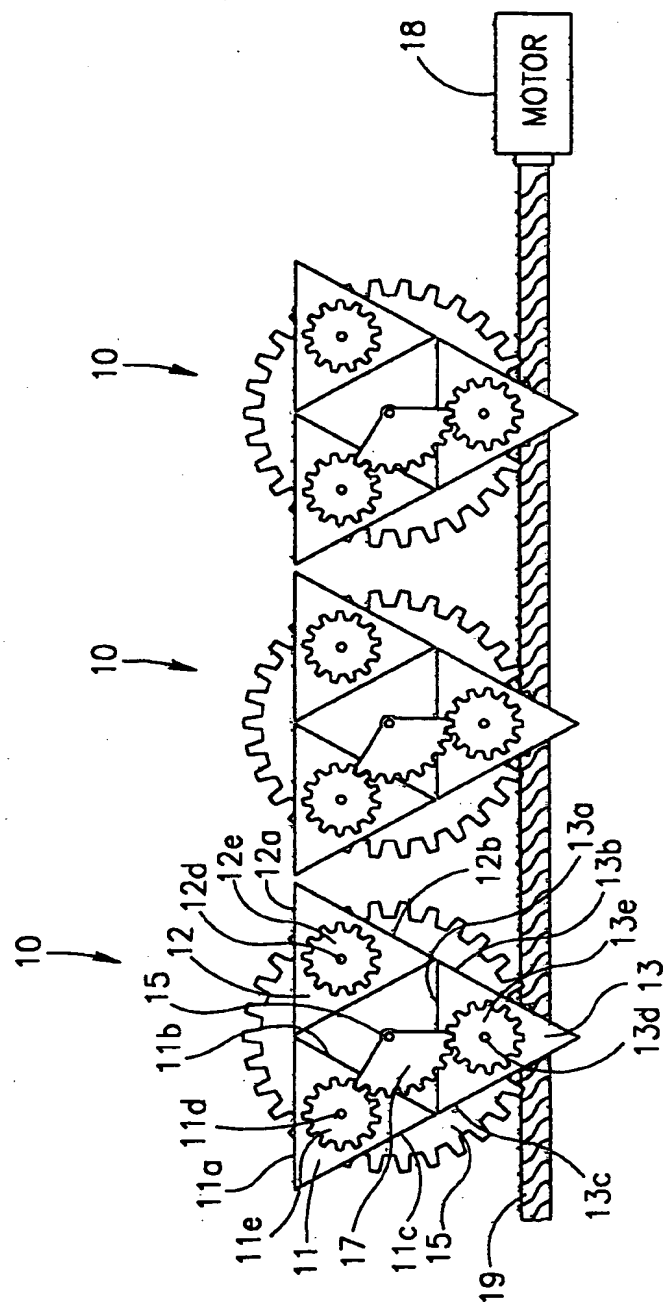
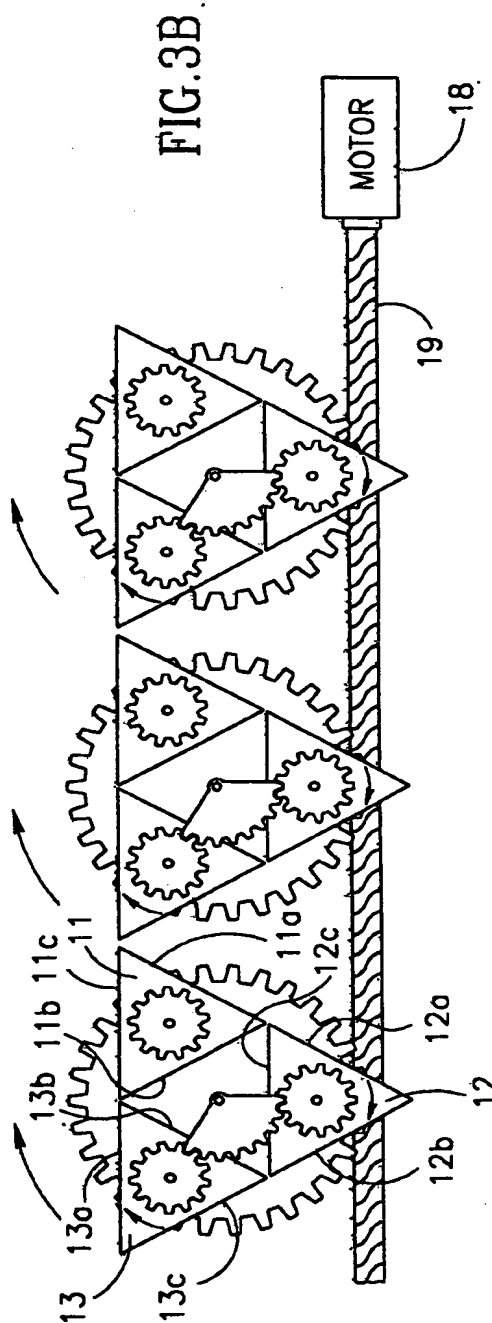
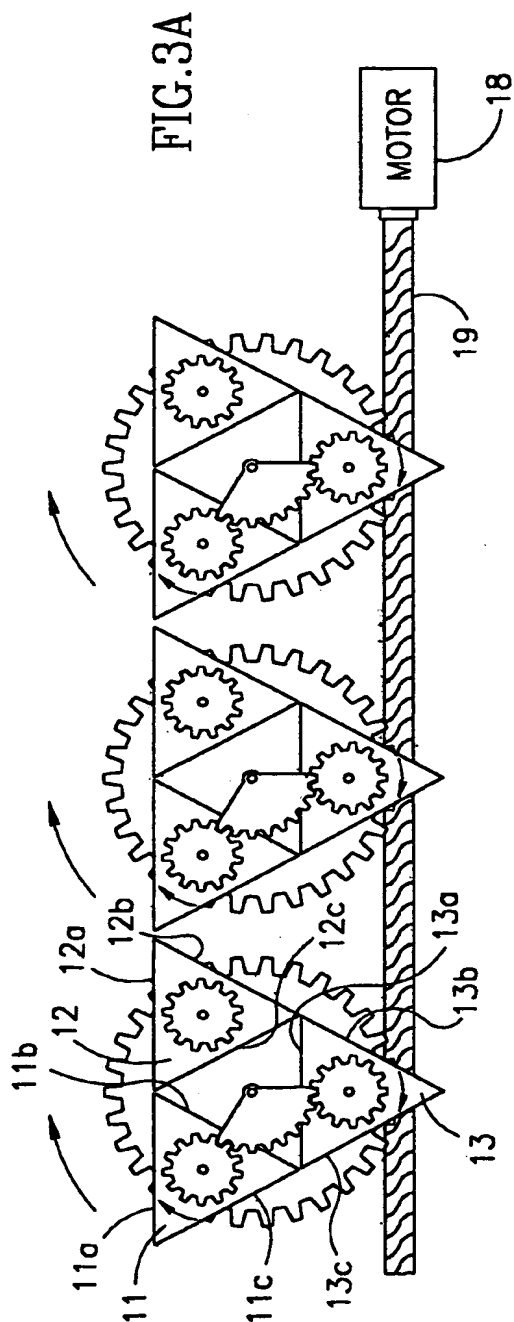
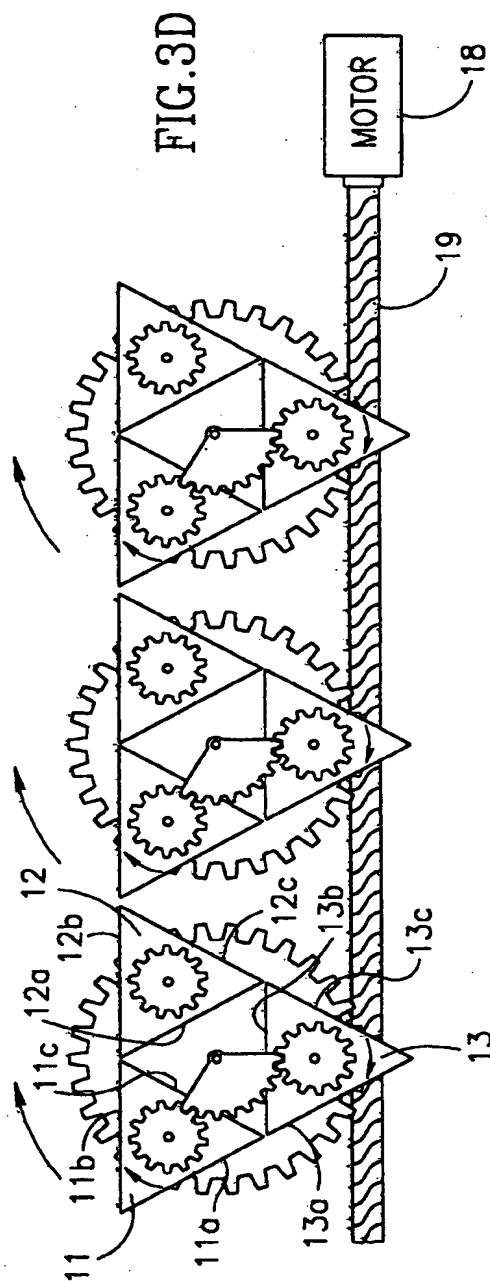
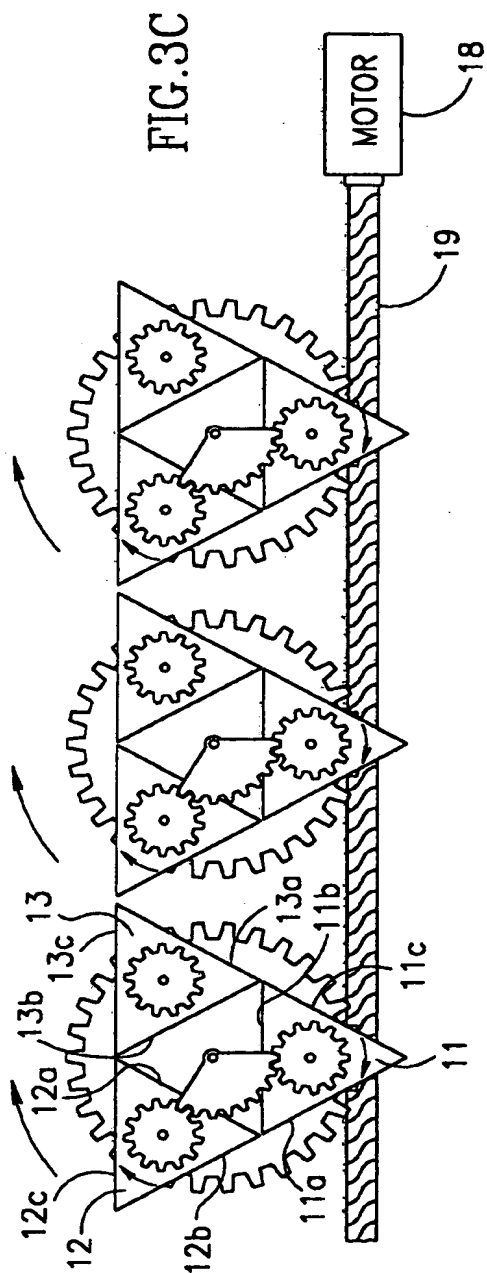


FIG. 2

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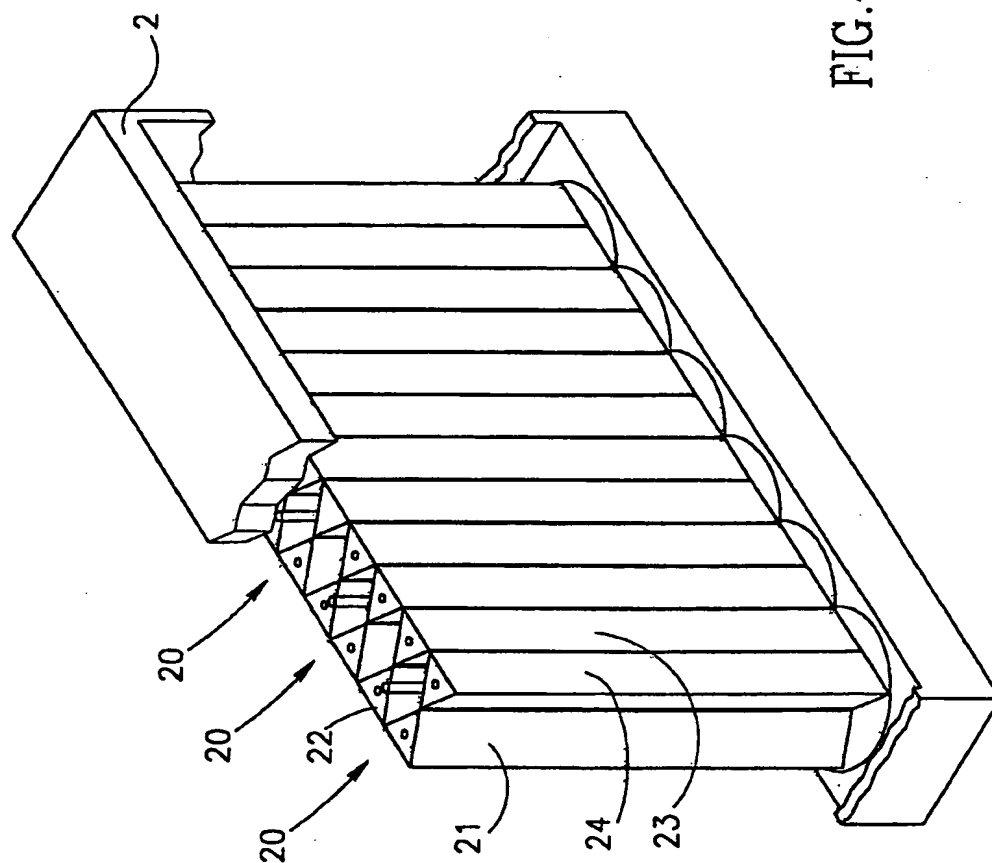
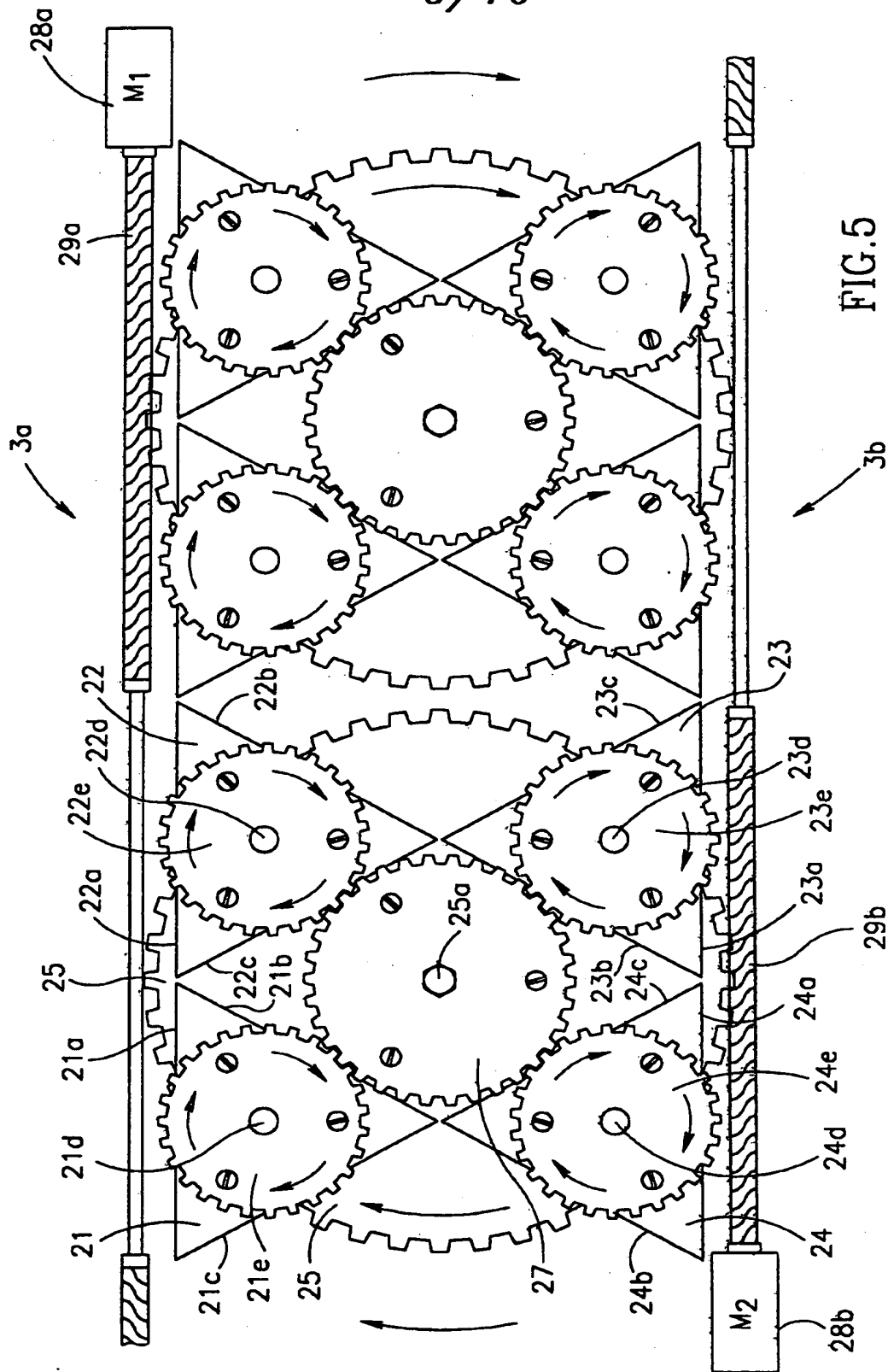


FIG. 4

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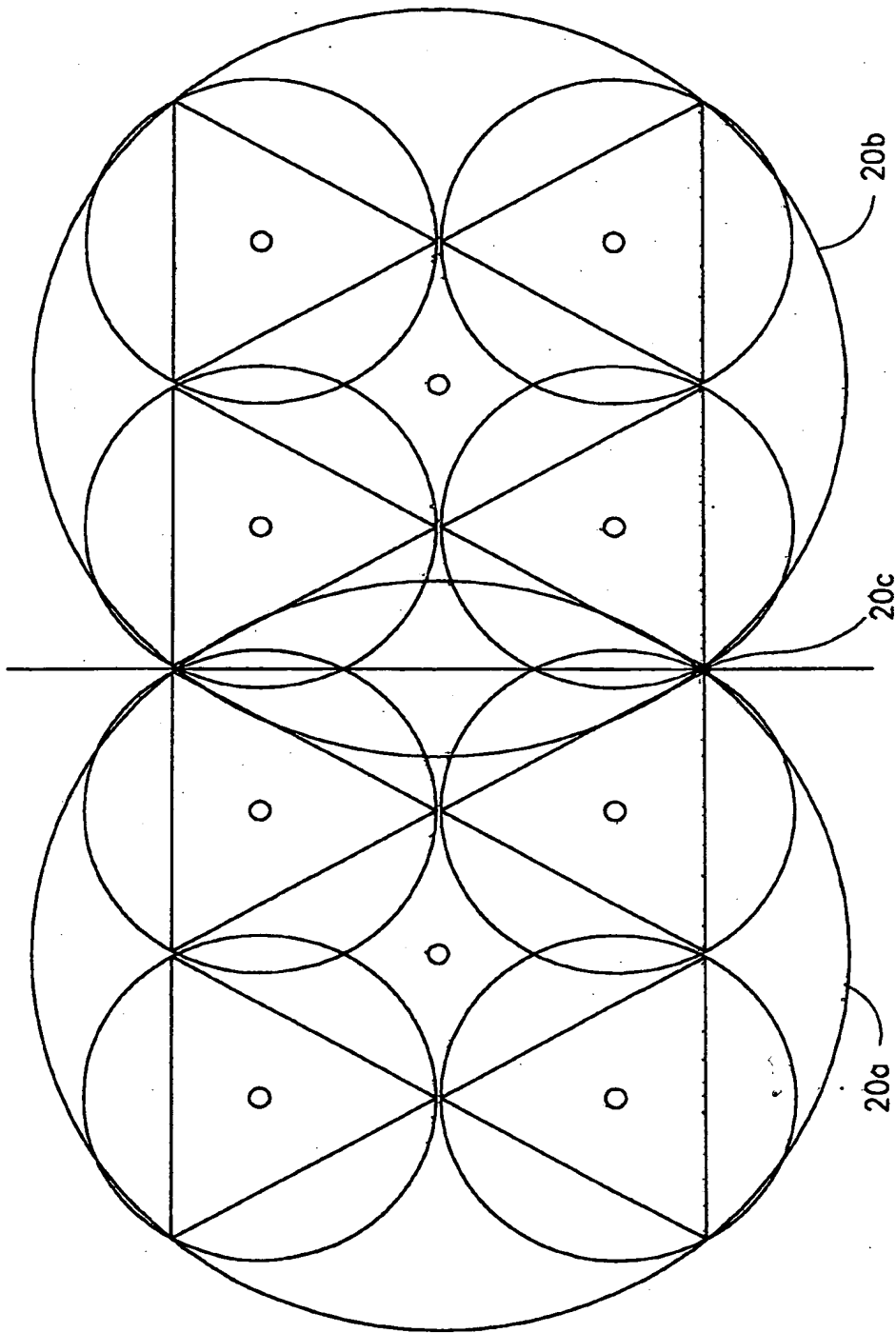


FIG. 6

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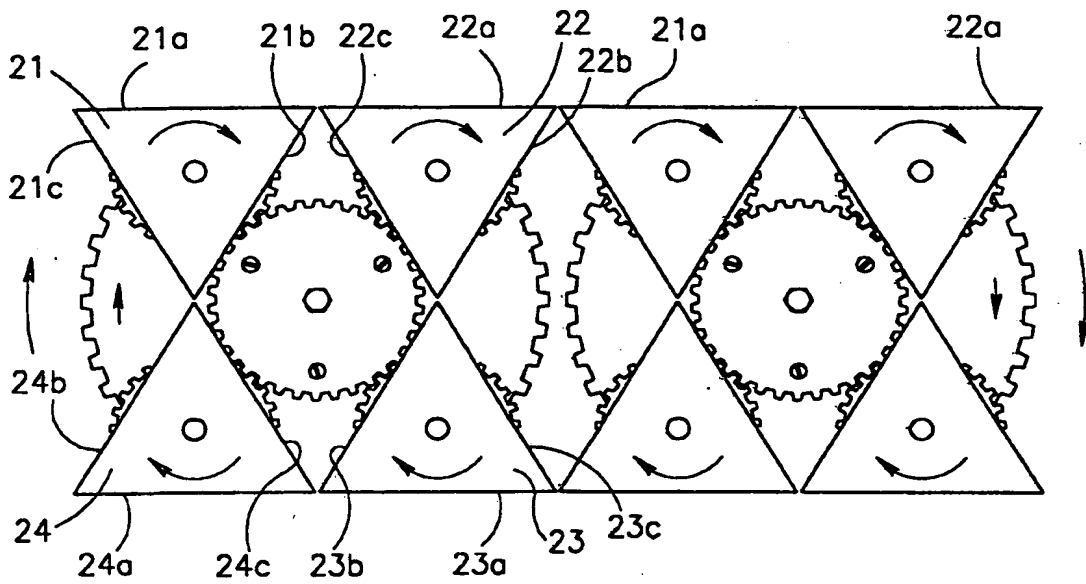


FIG. 7A

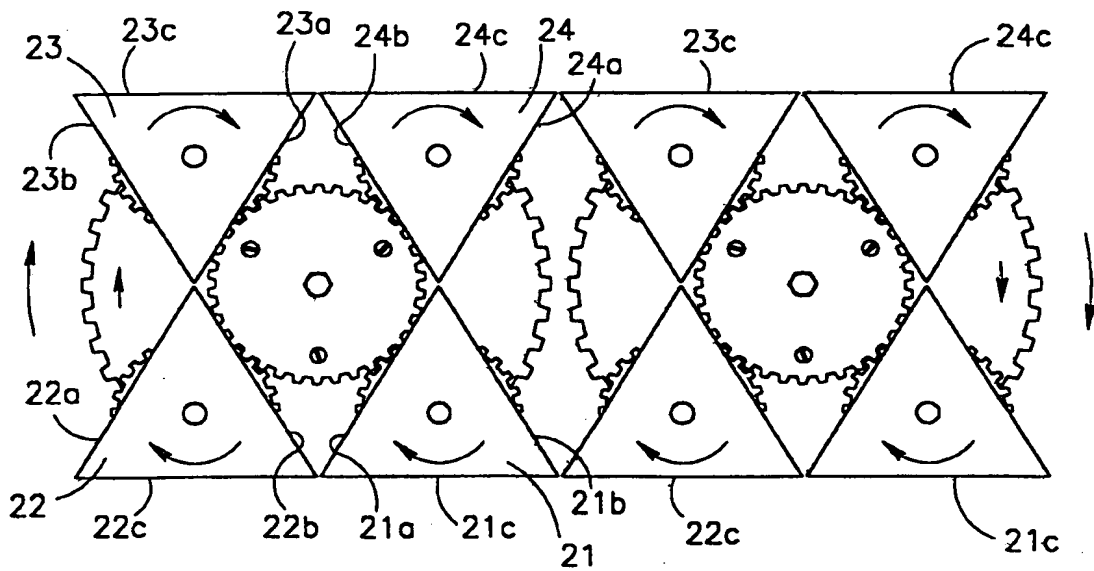


FIG. 7B

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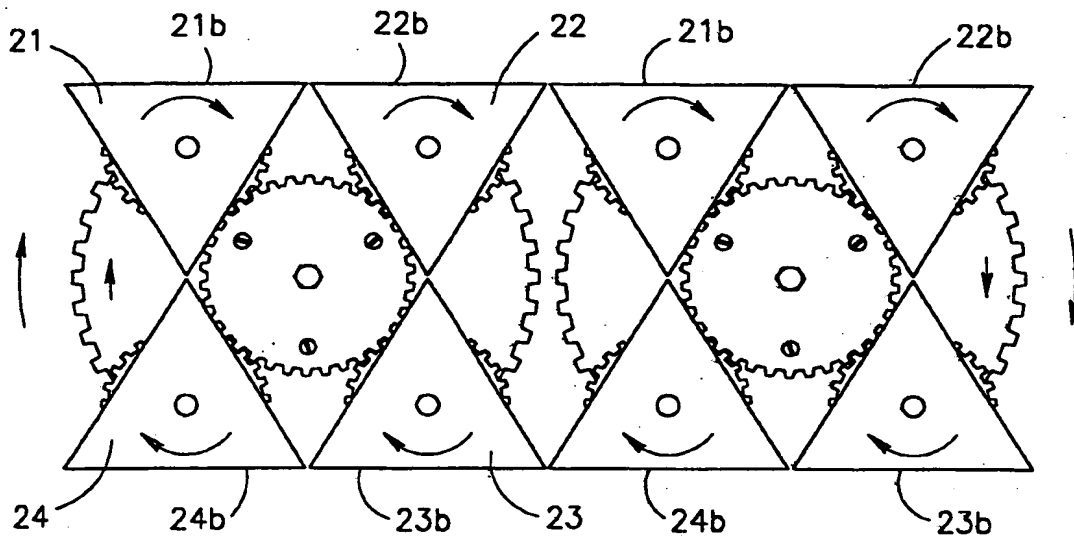


FIG. 7C

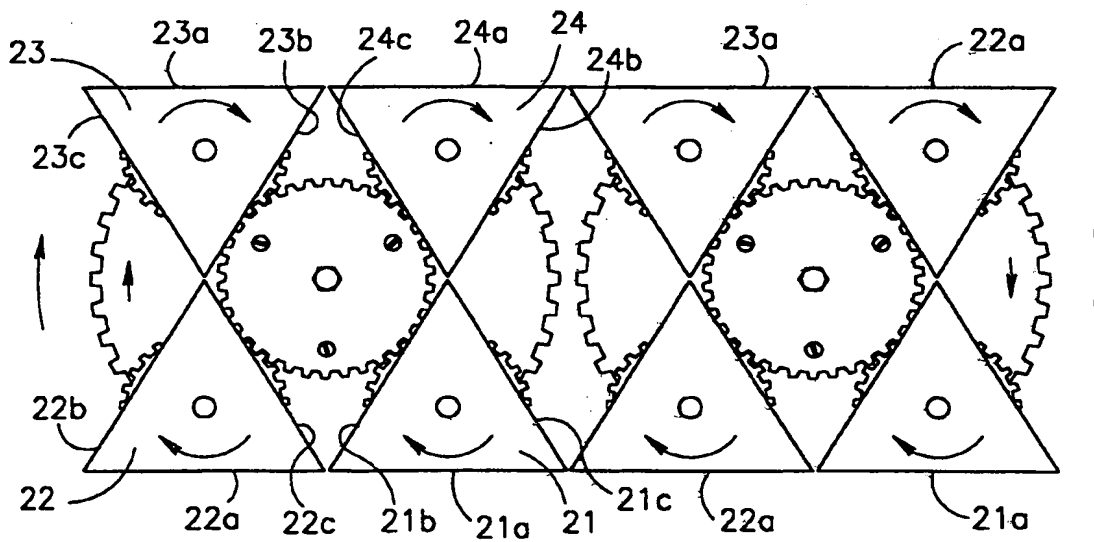


FIG. 7D



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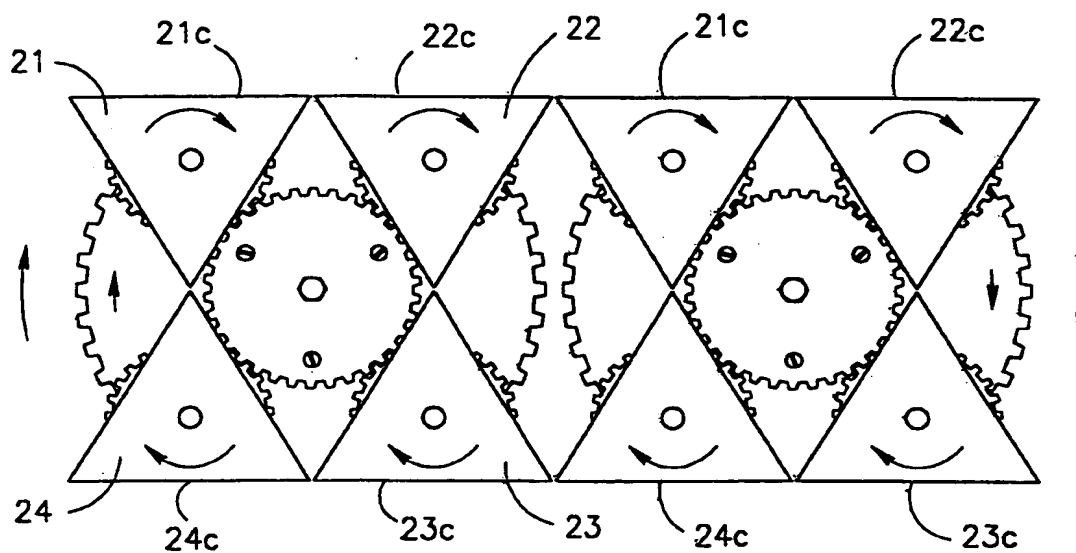


FIG. 7E

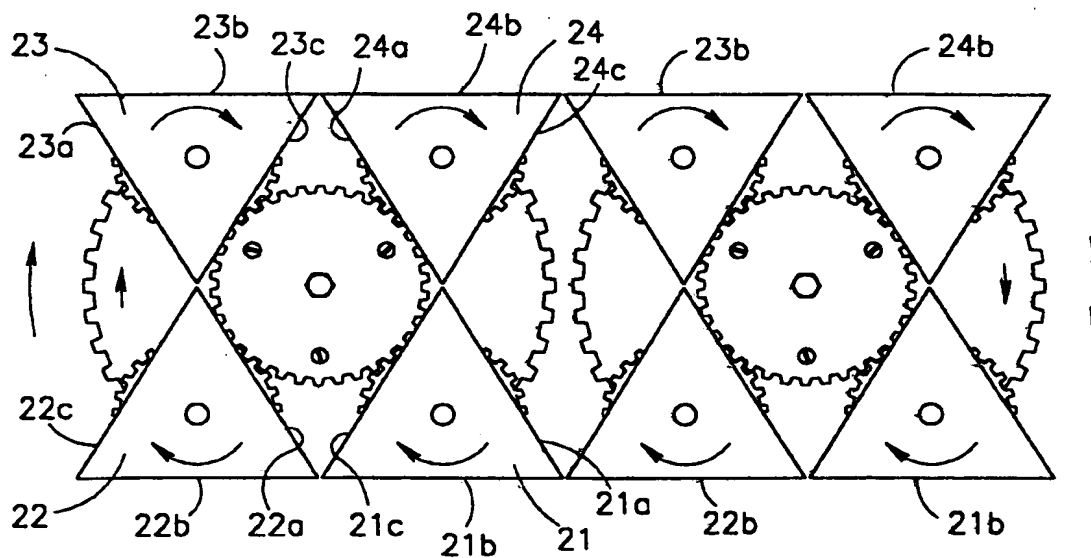


FIG. 7F

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IL 99/00671

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G09F11/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 295 11 539 U (HECKENDORF GERHARD) 28 March 1996 (1996-03-28) page 4, line 11 - line 34 page 5, line 1 - line 14; claim 1 figures 1,2	1, 13, 14
A		2-5
A	FR 2 707 031 A (SDS SIGNALISATIONS SA) 30 December 1994 (1994-12-30) the whole document	1-4, 13, 14
A	US 5 255 465 A (PEREZ HECTOR) 26 October 1993 (1993-10-26) cited in the application the whole document	1-5, 7, 8, 13, 14

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

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Date of the actual completion of the international search

9 March 2000

Date of mailing of the international search report

23/03/2000

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

information on patent family members

Inter. Appl. Application No

PCT/IL 99/00671

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 29511539 U	28-03-1996	NONE	
FR 2707031 A	30-12-1994	NONE	
US 5255465 A	26-10-1993	NONE	